Utility of a stent pusher catheter as a “mini-over-tube” in the endoscopic management of post-liver transplant biliary strictures

Fig. 1 **a** Cholangiography showing a severe and complex anastomotic stricture following a liver transplant. **b** Only one guidewire could be passed through the stricture: the second wire has flipped back (yellow arrow).

Fig. 2 **a** Insertion of a pusher tube over the first guidewire. The pusher tube would serve as a “mini-overtube.” **b** Illustration of the technique. Once the pusher tube (white arrow) was above the stricture (yellow arrow), the inner guiding catheter would be removed. A second wire could then be advanced through the mini-overtube (i.e., the pusher tube).

Biliary strictures and biliary leaks are the most common forms of post-transplant biliary complication [1–3]. These are thought to be due to multiple factors including ischemia, ischemia–reperfusion injuries, cytomegalovirus infection, and surgical techniques [2]. Endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography, and surgery are the primary approaches used in addressing strictures, with ERCP being the gold standard as a

diagnostic and therapeutic tool with the use of balloon dilations and placement of multiple parallel plastic stents [1–3]. However, some strictures have proven to be technically challenging or untreatable, mandating the use of percutaneous transhepatic cholangiographic drainage or even surgical hepaticojejunostomy. Herein we report a new method to deliver two wires above an impassable and severe anastomotic stricture by utilizing the pusher catheter as a “mini-overtube.”

Video 1

Demonstration of the pusher-overtube technique for difficult bile duct strictures. Stepwise approach to using a pusher catheter as a mini-overtube, allowing the insertion of two guidewires and thus two stents to the left and right hepatic ducts.

A 55-year-old man had undergone orthotopic liver transplantation (OLT) because of hepatitis C virus-related cirrhosis and hepatocellular carcinoma. After the OLT he had elevated results in liver function tests but biopsy had shown a viable liver transplant. Therefore the patient had undergone ERCP, which had shown an anastomotic biliary stricture. This had been managed by sphincterotomy and placement of a single 10-Fr 12-cm plastic stent because of the severity of the stricture.

At follow-up ERCP, the previous stent was removed using a snare. Biliary sphincterotomy and balloon dilation of the stenosis was performed (6-mm Titan balloon; Cook Medical, Winston Salem, North Carolina, USA) with removal of debris and sludge and extraction of the balloon without complications. However, on further evaluation only a single 0.035-inch guidewire (Metro; Cook Medical) could be advanced through the anastomosis (Fig. 1). Several techniques and accessories were used without success in the attempt to pass a second wire: a tapered tip catheter, various sphincterotomies, balloons, and straight and J-tipped wires. Because the path was so narrow and tortuous, an alternative approach was pursued as follows. A stent delivery device (Cook Medical), namely the inner guiding catheter and pusher without the stent, was passed over the existing

Fig. 3 **a** Cholangiography showing the pusher tube above the stricture. The yellow arrows show the upper end of the pusher tube. **b** Illustration of the technique. The “above-the-stricture” (white arrow) location of the pusher tube allows the the placement of two or more wires. **c** Cholangiography shows two wires above the stenosis.

Fig. 4 **a** Deployment of two 10-Fr plastic stents. **b** Final appearance of the deployed stents.

guidewire that had crossed the stricture proximally (► Fig. 2a, ► Video 1). Once the tip of the pusher was above the stricture (► Fig. 2b), the inner guiding catheter was removed, leaving the pusher in situ (► Video 1). The pusher could thus be utilized as a “mini-overtube” allowing the advancement of a second wire inside across the severe anastomotic stricture, so that now two wires could be delivered above the stenosis, one each into the right and left hepatic ducts (► Fig. 3b, ► Video 1). The pusher tube was then withdrawn, thus allowing the successful insertion of two 10-Fr 12-cm plastic stents (Cotton-Huibregtse; Cook Medical), one along each wire with both stents crossing the stricture (► Fig. 3, ► Video 1).

On subsequent ERCP, dilation of the stenosis was more easily obtained (8-mm balloon, Titan; Cook Medical), and again successful insertion of two plastic stents, one along each wire with both stents crossing the stricture (10-Fr Solus plastic double-pigtail 4-cm; 12-cm Cotton-Huibregtse Amsterdam plastic stent) (► Fig. 4, ► Video 1).

In summary, we have presented a novel method that allows passage of two (or more) wires above a tight biliary stricture, thus permitting the use of more than one stent to treat a complex stricture. The concept of “mini-overtube” in ERCP is useful as it expands the therapeutic possibilities in complex cases such as the one presented.

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